Edmonton's 2011 International Conference on Urban Traffic Safety

Pre-conference Workshop:

Unlicensed drivers: Are they high risk?

Convenor: Barry Watson

Centre for Accident Research & Road Safety - Queensland

CARRS-Q is a joint venture initiative of the Motor Accident Insurance Commission and Queensland University of Technology

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CRICOS No. 00213J

Worksop plan

- Workshop introduction: 1:00 – 1:10pm
- Presentation & questions: 1:10 – 2:15pm
- Break: 2:15 – 2:45pm
- Workshop discussion 2:45 – 4:00pm
- Close 4:00 – 4:15pm

Overview

- Road safety implications of unlicensed driving
- Present results from three studies examining:
  - the crash involvement of unlicensed drivers
  - the impact of licence disqualification on offending
  - characteristics of unlicensed driving offenders
- Countermeasure implications
- Discussion of high-risk groups and innovative countermeasure options

Workshop objectives

- To critically explore:
  - the behaviour of unlicensed drivers
  - the crash risk associated with unlicensed driving
  - factors contributing to unlicensed driving
  - the adequacy of current countermeasures
- To promote discussion concerning:
  - local factors contributing to unlicensed driving
  - specific subgroups at risk for unlicensed driving
  - innovative countermeasures

Who are unlicensed drivers?

- All those who drive without a valid licence
  - Expired licence
  - Inappropriate licence
  - Drive outside of restrictions
  - Suspended from driving
  - Disqualified from driving
  - Don't currently hold a licence
  - Never held a licence

Sources: Watson *et al*, 1996; Watson, 1998, 2004a

Road safety implications of unlicensed driving

- Undermines licensing system
  - reduces ability to monitor & manage drivers
  - undermines deterrent effect of licence loss
- Impact on road toll
  - crashes involving at least one unlicensed driver account for 10% of deaths in Aust. and 20% in USA
- Link with high risk driving
  - drink driving, speeding, motorcycle use
  - more deviant, repeat offending

Sources: Griffin & DeLaZerda, 2000; Scopatz et al., 2003; Watson, 1997, 2004a

Crash driver unlicensed

A 17-year-old unlicensed driver was behind the wheel of a car that crashed into a tree and exploded, incinerating four teenage joyriders, Victorian police said yesterday.

The driver and three of his friends, including a girl, 17, died in the accident near Bendigo. A male passenger, 18, was thrown clear and was recovering in hospital. The driver had a learner's permit.

Drink-driver blows into record books

A SOUTH Australian man has blown his way into the record books by registering 0.497 — nearly 10 times the legal limit — at a breath-testing station on Saturday.

The 26-year-old unlicensed driver from Mt. Gambier, in the state's south-east, was driving an unregistered car when he was pulled over by police about 2am as part of a random breath testing operation.

The reading of 0.497 is the highest blood alcohol level recorded by a driver in South Australia and one of the highest in Australia and the world. A man from Rushergien in Victoria blew 0.499 in September 1994.

In Queensland, one of the highest blood alcohol levels recorded in recent times was in 1993 when a Bowen man was arrested twice for drink driving with levels of 0.36 and 0.28.

The man died while police were escorting him to a car yard to sell his car after a court appearance.

And in 1994, a Townsville school bus driver recorded 0.26 after the bus he was driving was involved in an accident which claimed the life of an elderly woman.

Medical experts said it was incredible that he was even conscious with such a high blood alcohol level, but police at the scene said he appeared to be only moderately affected by alcohol.

"Speaking to one of the lads that was at the scene, he said he was not too bad, he was moderately affected," Mount Gambier acting officer in charge Sergeant Terry Patton said yesterday.

"He was middle of the range, he said he had been consuming beer most of the night."

Drug and Alcohol Council director Robert Ali said people with blood alcohol levels that high would normally be comatose or almost dead.

A blood alcohol level of 0.4 was potentially lethal, while many drinkers would be unconscious at 0.2.

"You are virtually comatose at 0.2 and 0.4-plus is potentially life threatening," he said. "I think it's an extraordinarily high level, it's the highest I've ever heard."

Australian Medical Association president Rodney Pearce said the man must have been accustomed to drinking large quantities of alcohol to appear to be moderately affected with such a high blood alcohol content.

The man, whose name has not been released, will appear in court later this year.

Man faces his 14th drink-drive charge

Prior research into unlicensed driving (1)

- Limited research has historically been undertaken into the issue
- Prior research has focused on:
  - analysis of fatal crash statistics
  - postal surveys of offenders featuring relatively low response rates
  - qualitative interviews featuring small samples
  - focus on disqualified and suspended drivers
  - very few roadside surveys conducted (although one was conducted in New Brunswick in 2002)

Sources: Watson, 1998, 2004a

Prior research into unlicensed driving (2)

- Difficult to assess prevalence of unlicensed driving
- Self-report surveys suggest that between 30% - 60% of disqualified drivers continue to drive
- Crash data often used as a surrogate measure
  - over 5% of drivers and 19% of motorcycle riders involved in fatal crashes are unlicensed in Australia
  - over 10% of drivers involved in fatal crashes in the USA are unlicensed
  - DeYoung et al (1997) estimated that suspended/revoked drivers were almost four times more likely to be involved in a fatal crash compared to licensed drivers

Sources: FORS, 1997; Griffin & DeLaZerda, 2000; Scopatz et al, 2003; Watson, 1998, 2004a

Prior research into unlicensed driving (3)

- Limited research into the factors contributing to unlicensed driving
- Self-report surveys highlight a variety of reasons for driving unlicensed including employment needs, family and social needs, lack of public transport
- Provide little insight into underlying motivations for behaviour
- Perceived risk of apprehension for unlicensed driving appears to be low in most jurisdictions

Effectiveness of licence disqualification

- General deterrent
  - Only sanction consistently linked to community-wide reductions in drink driving
- Specific deterrent
  - Effective in reducing both alcohol-related and other offences/crashes eg. Siskind (1996)
  - Acts as an exposure control measure
  - Far from perfect, since many offenders continue to drive

Disqualified driver effect

- Traditional view is that unlicensed drivers drive more cautiously to avoid detection
  - reflected in reduced reoffence rates after disqualification periods
  - reported by offenders in self-report surveys
- Others have questioned this view, arguing that offenders become better at avoiding detection not necessarily more cautious
- Distinction has important policy implications

Sources: Watson, 2004a,c

Countermeasures to unlicensed driving

- Administrative policies
  - Compulsory carriage of licence
  - Requirement to surrender revoked/suspended licences
  - Valid licence required to register motor vehicles
  - Restricted licences available for work purposes
- Enforcement practices
  - Targeted licence checking
  - Random licence checking
  - Incorporating licence checking into other activities e.g. random breath testing (RBT)
  - Improving roadside access to licensing information

Countermeasures to unlicensed driving

- Penalties and sanctions
  - Higher fines and/or jail terms for offenders
  - Alcohol ignition interlocks
  - Vehicle impoundment or immobilisation
  - License plate actions
  - Rehabilitation programs
- Public education
- Work-related initiatives
  - Checking of employee licence status
  - Providing employees access to licence information
- Electronic licences

Key research questions

1. Do unlicensed drivers engage in more risky driving than other drivers?
2. Is unlicensed driving associated with a higher crash risk compared to legal driving?
3. Do unlicensed drivers represent a homogenous group, in terms of their characteristics and on-road behaviour?
4. How effective are current administrative and enforcement policies in preventing unlicensed driving?
5. What are the personal and social factors contributing to unlicensed driving behaviour?

Study 1: Analysis of crash data

- **Rationale**
  - To examine the crash involvement patterns of unlicensed drivers and compare them with those of licensed drivers

Sources: Watson, 2004a,c; Watson & Steinhardt, 2006, 2007; Watson et al., in preparation

Method (1)

- Analysed six years of Queensland road crash data (2003 - 2008)
- Compared unlicensed drivers and licensed drivers involved in crashes
- Included car, truck and bus drivers and motorcycle riders
- Examined all crash types, but focused on fatal and serious injury crashes
- Not all categories of unlicensed driver are individually identified in database

Method (2)

- Used quasi-induced exposure method to estimate exposure and risk of involvement in a crash for different groups
  - previously used by DeYoung, Peck & Helander (1997) in California
  - based on the assumption that the innocent parties in a multi-vehicle crash are incidental to the event and hence represent a random sample of drivers
  - used unit numbers assigned in database to identify drivers considered at fault by the police

Method (3)

- Quasi-induced exposure method:
  - Involvement rate (IR) = $\frac{\%\text{ at fault}}{\%\text{ innocent}}$
  - Crash (ratio) rate = $\frac{\text{IR for unlicensed drivers}}{\text{IR for licensed drivers}}$
  - Introduces in a range of potential biases related to:
    - ➢limiting analysis to multi-vehicle crashes
    - ➢how the police assess fault in crashes

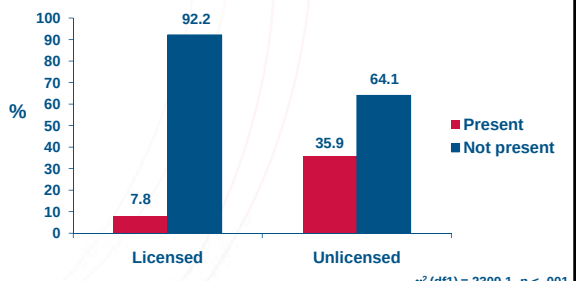
Study 1: Results (1)

1. Do unlicensed drivers engage in more risky driving than other drivers?

Overall crash involvement

- During the period, unlicensed drivers represented:
  - 8.9% of drivers involved in fatal crashes
  - 5.1% of drivers involved in serious injury (hospitalisation) crashes
  - 3.1% of drivers involved in minor injury crashes
  - 3.8% of drivers in property damage only (PDO) crashes
  - 3.8% of drivers involved in total crashes

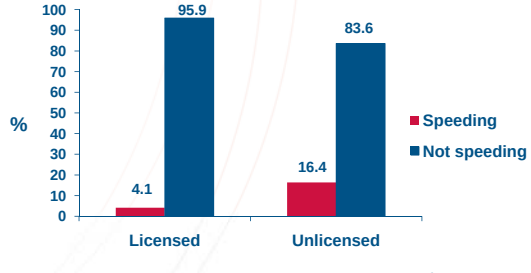
Serious casualty crashes by involvement of alcohol & drugs: Queensland 2003-08



Source: Queensland Road Crash Database, TMR

χ^2 (df1) = 2309.1, p < .001

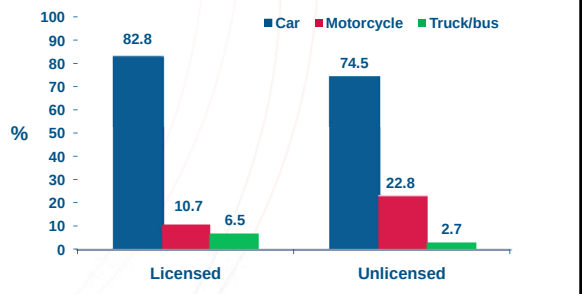
Serious casualty crashes by involvement of excessive speed: Queensland 2003-08



Source: Queensland Road Crash Database, TMR

χ^2 (1) = 863.1, p < .001

Serious casualty crashes by type of vehicle: Queensland 2003-08



Source: Queensland Road Crash Database, TMR

χ^2 (2) = 390.6, p < .001

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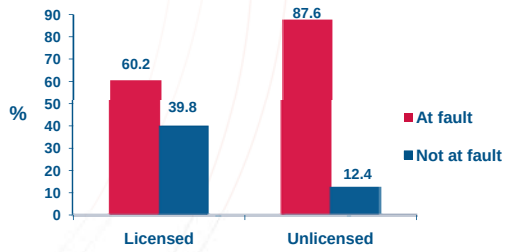
Serious casualty crashes by unit considered at fault: Queensland 2003-08



Source: Queensland Road Crash Database, TMR

χ^2 (1) = 787.5, p < .001

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Study 1: Results (2)

2. Is unlicensed driving associated with a higher crash risk compared to legal driving?
   - Risk of involvement in a crash
   - Severity of crashes

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Risk of involvement in a multi-vehicle crash by driver type for Queensland: 2000-04

Driver Group	Fatal Crashes	Total Crashes
Licensed drivers[1]	1.00 - n=1268	1.00 - n=163298
All unlicensed drivers	**4.08** (2.03 – 8.18) n=88	**3.02** (2.76 – 3.32) n=4311
Never licensed drivers		**9.47** (6.07 – 14.78) n=387
Disqualified/suspended drivers		**2.85** (2.51 – 3.23) n=2167
Other unlicensed drivers		**3.17** (2.63 – 3.82) n=1055
Inappropriate class		**2.15** (1.70 – 2.72) n=557
Expired licence drivers		**2.54** (1.58 – 4.08) n=145

1. Primary reference category

Source: Queensland Road Crash Database, TMR

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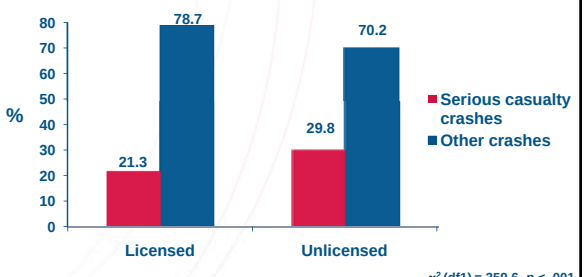
Severity of crashes involving licensed and unlicensed drivers: Qld 2003-08



Source: Queensland Road Crash Database, TMR

χ^2 (df1) = 359.6, p < .001

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Risk of involvement in a serious casualty crash relative to a minor crash in Qld: 2003-08

Type of driver	Odds ratio risk	99% CI
All licensed drivers[1]	1.00	----
All unlicensed drivers	1.57	1.48 – 1.67
Inappropriate class	5.37	4.03 – 7.16
Never licensed	1.65	1.41 – 1.92
Disqualified/suspended	1.50	1.37 – 1.64
Expired	1.27	1.04 – 1.55
Other unlicensed	1.44	1.27 – 1.64

1. Primary reference category

Source: Queensland Road Crash Database, TMR

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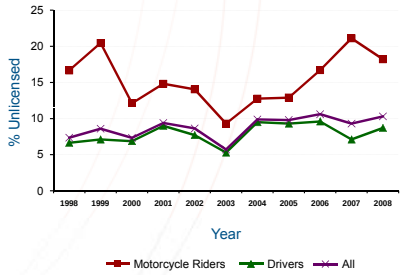
Study 1: Results (3)

3. Do unlicensed drivers represent a homogenous group?
   - Unlicensed drivers involved in serious casualty crashes are more likely to:
     - be male (81% vs 65%)
     - be under 24 yrs of age (48% vs 26%)
     - ride motorcycles (23% vs 11%)
     - be involved in crashes at night (47% vs 27%) and on weekends (34% vs 25%)
     - be involved in single vehicle crashes (58% vs 27%)
     - be involved in crashes involving risky behaviours

Study 1: Results (4)

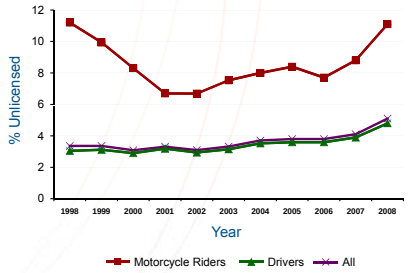
3. Do unlicensed drivers represent a homogenous group?
   - *Never licensed* and *disqualified/suspended* drivers emerged as problem sub-groups
   - Important differences between unlicensed drivers and riders crash involvement

Proportion of unlicensed controllers in fatal crashes in Queensland



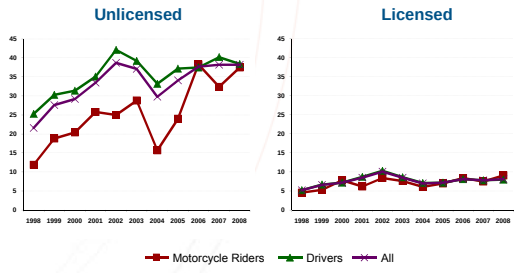
Source: Queensland Road Crash Database, TMR

Proportion of unlicensed controllers in total crashes in Queensland



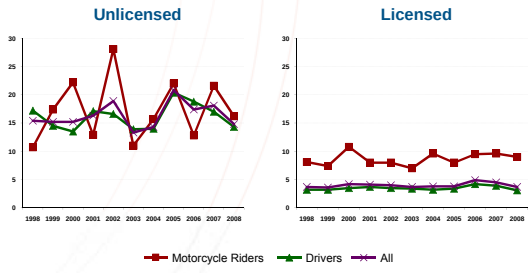
Source: Queensland Road Crash Database, TMR

Proportion of controllers involved in serious casualty crashes, by alcohol/drugs



Source: Queensland Road Crash Database, TMR

Proportion of controllers involved in serious casualty crashes, by speeding



Source: Queensland Road Crash Database, TMR

Differences between unlicensed drivers and motorcycle riders

- Many similarities in the crash involvement patterns of unlicensed drivers and riders
  - over-representation in serious crashes
  - these crashes are more likely to involve high-risk behaviours
- Long-term crash involvement of unlicensed drivers appears stable, compared to riders
- Suggests that countermeasures have not had a differential impact on unlicensed drivers

Source: Queensland Road Crash Database, TMR

Study 2: Impact of licence disqualification on offending

- **Rationale**
  - To explore the impact of disqualification on the behaviour of drink drivers by comparing their traffic offence histories during periods of disqualification with legal driving

Source: Watson, Armstrong, Livingstone & Watson, 2010

Drink driving sanctions in Queensland

- Licence disqualification generally applied to all drink driving offenders
- However, restricted 'work' licences available to first offenders with a BAC < .150 on economic hardship grounds
- Voluntary drink driver rehabilitation programs offered in some courts
- Vehicle impoundment introduced for repeat, high-range (BAC ≥.150) offenders in late 2008
- Alcohol ignition interlocks introduced for high-range first offenders and repeat offenders in 2010

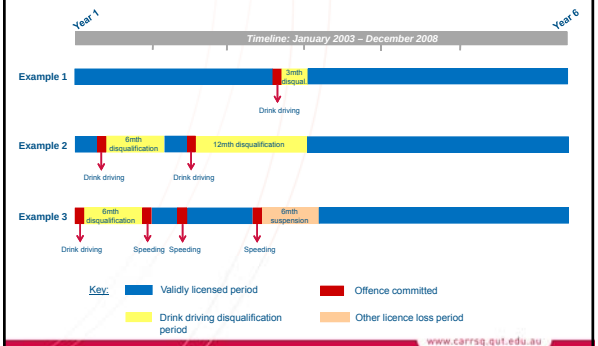
Method (1)

- Traffic offence histories were obtained from the Dep't of Transport & Main Roads for all drivers who experienced a licence sanction in Queensland between January 2003 and December 2008 (N = 546,616)
- The sample included drivers who were:
  - disqualified by a court (e.g. for drink driving)
  - those who were placed on a restricted licence for drink driving
  - whose licence had been suspended administratively (e.g. for accumulation of demerit points)

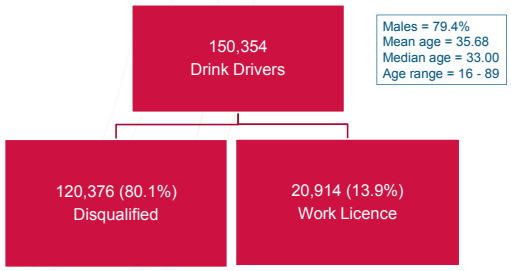
Method (2)

- Analyses focused on those who were disqualified or received a restricted 'work' licence for a drink driving offence during the period (n = 150,354)
- 34,986 (23%) of these drivers committed more than one drink driving offence in the period
- Examined a range of offences, including drink driving, unlicensed driving, speeding, and other moving offences
- Partitioned offenders' driving histories during periods of disqualification and legal driving, across the six year period

Partitioning of driving histories



Drink driving sanctions

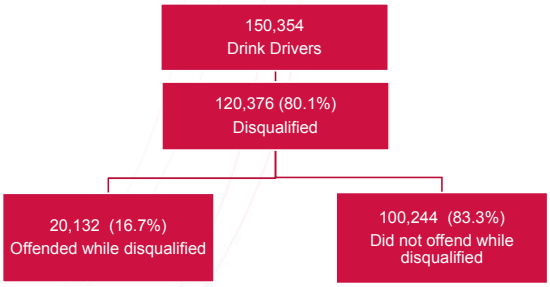


Note: At the time of data extraction, 6% of the drink driving offences committed were still pending a court decision.

Characteristics of disqualified drivers

		%
Gender	Male	79.3
	Female	20.7
Age	16-24	20.0
	25-29	22.6
	30-39	27.3
	40-49	16.5
	50-59	9.1
	60+	4.5
Drink Driving offender type	Single	55.6
	Multiple	44.4
	< 0.15 BAC	72.0
	≥ 0.15 BAC	28.0

Overall offending during sanction period



Overall offending patterns

	During disqualification		
	N	% of all disqualified	% of offenders who offended while disqualified
Unlicensed	14894	12.2	71.9
Drink driving	5225	4.3	25.2
Seatbelt	3823	3.1	18.5
Speeding	3719	3.0	18.0
Unregistered	3721	3.0	18.0
Other moving	3141	2.5	15.2
Dangerous	594	0.5	2.9
Mobile phone	210	0.2	1.0

* Percentages do not total 100% as some offenders committed more that one type of offence

Rate of offending while disqualified vs. offending while licensed

	Mean no. of offences per year		Rate of offending while disqualified vs offending while licensed
	While licensed	While disqualified	
Any offence	**4.52**	**0.69**	0.15
Drink driving	**0.70**	**0.04**	0.06
Seatbelt	**0.31**	**0.06**	0.10
Speeding	**1.25**	**0.08**	0.06
Unregistered	**0.73**	**0.12**	0.07
Other moving	**0.92**	**0.06**	0.16
Dangerous	**0.06**	**0.01**	0.12
Mobile phone	**0.03**	**0.01**	0.20

p < .001

Characteristics of those who offended during a disqualification

		Offended while disqualified %	Did not offend while disqualified %	
Gender	Male	85.9	78.0	$\chi^2(1) = 647.9$, $p<.001$, $\phi = .07$
	Female	14.0	22.0	
Age	16-24	22.7	19.4	
	25-29	27.0	21.7	
	30-39	29.7	26.8	
	40-49	13.6	17.1	
	50-59	5.3	9.8	$\chi^2(5) = 1279.4$, $p<.001$, $\phi = .10$
	60+	1.7	5.1	
DD offender type	Single	29.4	60.8	$\chi^2(1) = 6696.4$, $p<.001$, $\phi = .24$
	Multiple	70.6	39.2	
	< 0.15 BAC	60.0	74.4	$\chi^2(1) = 1731.3$, $p<.001$, $\phi = .12$
	> 0.15 BAC	40.0	25.6	

Study implications (1)

- Licence disqualification appears to substantially reduce drink driving and other traffic offences
- However, it is unclear whether this reduction is a function of:
  - Less driving, i.e., reduced exposure
  - Safer driving than would otherwise be the case
  - More detection-evasion behaviour
  - Combinations of the above

Study implications (2)

- High-range BAC offenders and multiple offenders are significantly more likely to commit traffic offences during periods of disqualification
- This confirms the value of additional sanctions being applied to these drivers which will control or modify their behaviour, such as:
  - Vehicle impoundment
  - Alcohol ignition interlocks
  - More widespread drink driving rehabilitation

Study 3: Cross-sectional survey of offenders

- **Rationale**
  - To examine the characteristics and self-reported behaviour of a sample of unlicensed drivers not involved in crashes

Sources: Watson, 2002, 2004a,b

Method (1)

- Methodological difficulties
  - obtaining a random, representative sample
  - unlicensed drivers are relatively transient group
  - low response rates
  - validity of self-report data

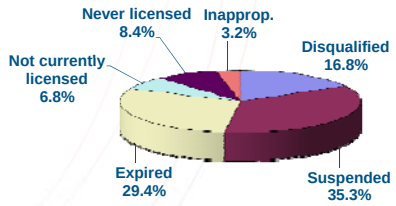
Method (2)

- Utilised bottle-neck created by attendance at court
- Piloted both interview and self-administered questionnaires
- Opted for a voluntary, anonymous interview
- $25 payment for participation (25 minutes)
- All interviews conducted in Brisbane Central Magistrates Court

Results (1)

- Sample characteristics
  - 309 offenders participated from 495 approached (i.e., 62.4% response rate)
  - females more likely to agree to participate than males
  - no difference in response rate between drivers charged with Unlicensed and Disqualified driving
  - most common reasons cited for refusal was 'being in a rush' or 'having no time'

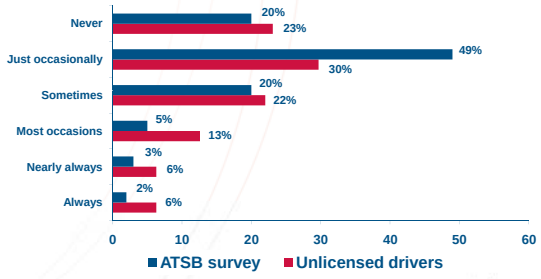
Figure 1: Reason for being unlicensed (*n* = 309)



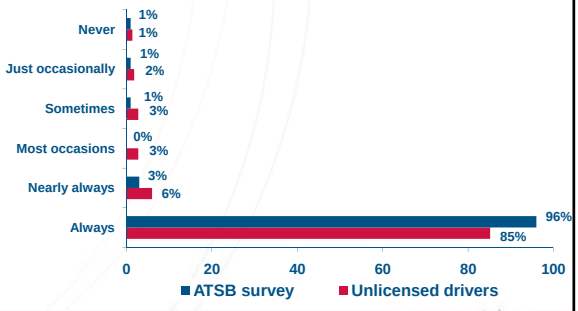
Study 3: Results (1)

1. Do unlicensed drivers engage in more risky driving than other drivers?

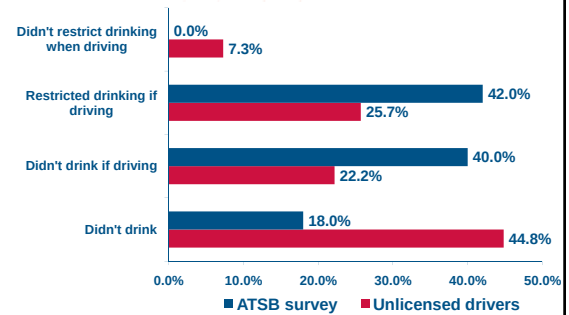
Reported frequency of driving 10km/h or more over the speed limit (*n* = 286/1430)



Reported frequency of wearing a seat belt as driver (*n* = 283/1593)



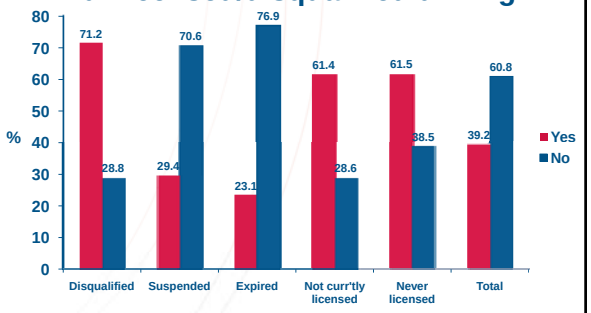
General approach to drink driving (*n*=288/1453)



Study 3: Results (2)

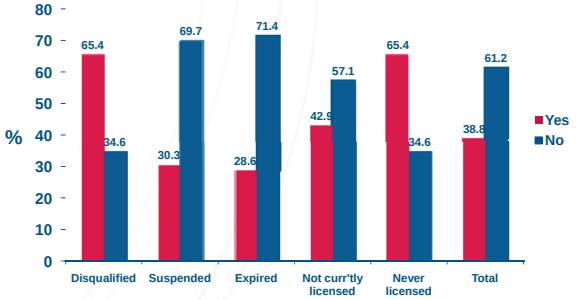
3. Do unlicensed drivers represent a homogenous group?
   - Significant differences were found between unlicensed driver types in terms of:
     - Age
     - Education level
     - Prior criminal convictions
     - Prior convictions for unlicensed driving
   - *Disqualified*, *not currently licensed* and *never licensed* drivers emerged as problem sub-groups

Prior conviction for unlicensed/disqualified driving



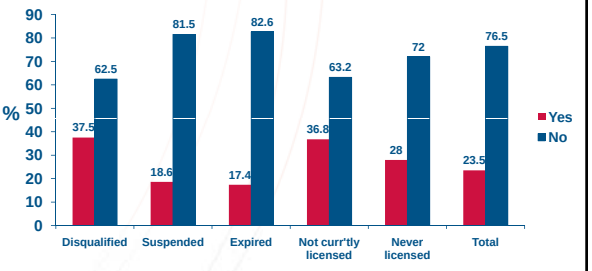
χ^2 (5,309) = 57.70, p < .001

Prior criminal conviction



χ^2 (5,309) = 34.19, p < .001

Drove when they thought they may be over the alcohol limit



χ^2 (5,289) = 10.71, p = .058

Study 3: Results (3)

4. How effective are current administrative and enforcement processes in preventing unlicensed driving?

Punishment avoidance (1)

- 164 (53.1%) offenders reported being pulled over for a RBT at least once
  - 97 (31.4%) reported that their licence wasn't checked at least once
  - 58 (18.8%) failed to have licence checked on two or more occasions
- Small number of offenders didn't have licence checked when caught speeding or for another offence

Punishment avoidance (2)

- 8 offenders avoided having their licence checked after a crash
- In total:
  - 113 (36.6%) were able to evade detection on one or more occasions
  - 67 (21.7%) evaded detection on two or more occasions
- Evasion of detection was significantly associated with the frequency of unlicensed driving

(r_{pb}=.31, p <.001)

Punishment avoidance (3)

"... it is possible that punishment avoidance does more to encourage crime than punishment does to discourage it. Offenders whose experience is limited largely to avoiding punishment may come to believe that they are immune from punishment, even in the face of occasional evidence to the contrary" (Stafford & Warr, 1993, p. 125)

Other key findings (1)

- Punishment avoidance was the strongest predictor of the reported frequency of unlicensed driving
- 31% of offenders reported that they continued to drive unlicensed after being detected (up until court date)
- Needing to drive for work purposes was a strong predictor of continued driving after detection
- Significant predictors of intentions to drive unlicensed in the future were:
  - Mixing with others who drive unlicensed
  - Holding favourable attitudes to unlicensed driving
  - Anticipating fewer social punishments for the behaviour

Other key findings (2)

- The perceived likelihood of being caught for unlicensed driving was significantly lower than for being breath tested or caught speeding
- 62.5% were driving a vehicle they owned (including 32% of never licensed drivers)
- 41.6% claimed that they did not know they were unlicensed when detected (particularly expired drivers)

Policy implications (1)

- Findings question common assumption that unlicensed drivers drive in a more cautious manner (at least compared to licensed drivers)
  - Need to actively address the problem
  - Need to review policies which inadvertently exacerbate the problem e.g., licence loss and surrender policies
- Unlicensed drivers should not be treated as a homogenous group
  - Need multi-strategy approaches to address different groups of unlicensed drivers and riders

Policy implications (2)

- Need to improve the detection of unlicensed driving (minimise punishment avoidance)
  - compulsory carriage of licences
  - checking of licences as part of RBT
  - random licence checking
- Need to enhance punishment processes
  - examine adequacy of penalties
  - more tailored rehabilitation programs
  - wider use of alcohol ignition interlocks
  - introduce/enhance vehicle impoundment

Policy implications (3)

- Need to encourage participation in the licensing system
  - Reduce perceived benefits of driving for work while unlicensed
  - Reconsider the use of work licences to promote compliance with law
  - Incentives to participate in alcohol ignition interlock programs e.g., reduced suspension periods
  - Consider other incentives e.g., speed interlocks (?)
- Continue development of electronic licences

Limitations of research program

- Limited scope of studies
  - Study 1 & 2 focussed on Queensland
  - Study 3 focussed on Brisbane
- Study 1 relied on official crash data (which may be under-reported) and the quasi-induced exposure method
- Study 2 examined offences detected, not actual behaviour
- Study 3 relied on self-report data
- None of the studies focused on under-age driving or Indigenous offenders

Discussion questions

1. What particular factors contribute to unlicensed driving in your jurisdiction?
2. Are there any administrative or enforcement policies which inadvertently contribute to unlicensed driving in your jurisdiction?
3. Are there any specific high-risk unlicensed driver subgroups within your jurisdiction that require special attention?
4. What strategies are currently employed in your jurisdiction to target unlicensed driving?
5. What innovative strategies could be considered in your jurisdiction to target unlicensed driving?

Conclusion

- Can we make unlicensed drivers safer?
  - encourage drivers to participate in the system, exposing them to graduated licensing etc.
  - deter people from driving vehicles for which they do not have appropriate licence and experience
  - reduce disqualified and suspended driving, thereby improve the deterrent impact of sanctions
  - expose persistent offenders to rehabilitation that may assist them to resolve underlying problems

Questions?

b.watson@qut.edu.au

Mark your Diaries!

International Council on Alcohol, Drugs and Traffic Safety Conference (ICADTS T2013)

August 2013, Brisbane Convention and Exhibition Centre

References (1)

DeYoung D.J., Peck R.C. & Helander C.J. (1997). Estimating the exposure and fatal crash rates of suspended/revoked and unlicensed drivers in California. *Accident Analysis and Prevention*, 29 (1), 17-23.

FORS (1997). Profile of unlicensed motorists in fatal crashes. Monograph 20. Canberra: Federal Office of Road Safety (FORS).

Griffin L.I. and DeLaZerda S. (2000). *Unlicensed to kill*. Washington, DC: AAA Foundation for Traffic Safety.

Scopatz R.A., Hatch C.E., DeLucia B.H. and Tays K.A. (2003). Unlicensed to kill: The sequel. Washington, DC: AAA Foundation for Traffic Safety.

Siskind V. (1996). Does licence disqualification reduce reoffence rates? *Accident Analysis and Prevention*, 28 (4), 519-524.

Stafford M.C. & Warr M. (1993). A reconceptualization of general and specific deterrence. *Journal of Research in Crime and Delinquency*, Vol.30, No.2, 123-135.

Watson B. (1997). The crash involvement of unlicensed drivers in Queensland. *1997 Road Safety Research and Enforcement Conference*, Hobart, 9-12 November 1997.

Watson B. (1998). Methodological problems associated with surveying unlicensed drivers. *1998 Road Safety Research, Policing and Education Conference*, Wellington, New Zealand, 16-17 November 1998.

Watson B. (1998). Methodological problems associated with surveying unlicensed drivers. *1998 Road Safety Research, Policing and Education Conference*, Wellington, New Zealand, 16-17 Nov. 1998.

References (2)

Watson B. (2004a). *The psychosocial characteristics and on-road behaviour of unlicensed drivers*. Unpublished Doctorial Thesis. Brisbane: Queensland University of Technology.

Watson B. (2004b). How effective is deterrence theory in explaining driver behaviour?: A case study of unlicensed driving. *Proceedings of the 2004 Road Safety Research, Policing and Education Conference*. Perth: Road Safety Council, Government of Western Australia.

Watson B. (2004c). The crash risk of disqualified/suspended and other unlicensed drivers. Oliver, Williams & Clayton (Eds), *Proceedings of the 17th International Conference on Alcohol, Drugs and Traffic Safety (T2004)*, Glasgow: International Council on Alcohol, Drugs &Traffic Safety (ICADTS).

Watson B., Armstrong K., Livingstone K. & Watson B. (2010). Profiling the offence patterns of disqualified drink drivers in Queensland, Australia. Presentation at the 19th International Council on Alcohol, Drugs and Traffic Safety Conference (T2010), 22 - 26 August 2010, Oslo, Norway.

Watson B., Fresta J., Whan H., McDonald J., Dray R., Bauermann C. & Churchward R. (1996). *Enhancing driver management in Queensland*. Brisbane: Land Transport & Safety Division, Queensland Transport.

Watson B. & Steinhardt D. (2006). A comparison of the crash involvement of unlicensed motorcycle riders and unlicensed drivers in Queensland. 2006 Australasian Road Safety, Research Policing & Education Conference. Brisbane: Queensland Transport.

Watson B. & Steinhardt D. (2007). The long-term crash involvement of unlicensed drivers and riders in Queensland, Australia. Proceedings of the 18th International Conference on Alcohol, Drugs and Traffic Safety (T2007), Seattle, USA.

Risk of involvement in a multi-vehicle crash by driver type and crash severity for Queensland: 2004-08

Driver group	Risk of involvement in a crash				
	Fatal crash	Serious injury crash	Other injury crash	PDO crash	Total crashes
Licensed drivers[1]	1.00 n=1268	1.00 n=29930	1.00 n=71002	1.00 n=61098	1.00 n=163298
All unlicensed drivers	**4.08** (2.03 – 8.18) n=88	**2.82** (2.34 – 3.41) n=983	**3.13** (2.71 – 3.62) n=1749	**3.01** (2.58 – 3.52) n=1491	**3.02** (2.76 – 3.32) n=4311
Never licensed drivers		**15.22** (5.14 – 45.10) n=96	**7.58** (4.04 – 14.23) n=162	**8.63** (3.94 – 18.92) n=117	**9.47** (6.07 – 14.78) n=387
Disqualified/ suspended drivers		**2.40** (1.85 – 3.11) n=481	**3.10** (2.54 – 3.79) n=910	**2.93** (2.35 – 3.65) n=730	**2.85** (2.51 – 3.23) n=2167
Other unlicensed drivers		**3.25** (2.17 – 4.86) n=223	**3.33** (2.46 – 4.52) n=405	**2.90** (2.17 – 3.89) n=410	**3.17** (2.63 – 3.82) n=1055
Expired licence drivers		**2.13** (1.28 – 3.58) n=115	**2.01** (1.39 – 2.91) n=222	**2.33** (1.58 – 3.42) n=215	**2.15** (1.70 – 2.72) n=557
Inappropriate class of licence drivers		**2.27** (1.15 – 4.47) n=68	**2.14** (0.98 – 4.68) n=50	3.69 (0.86 – 15.76) n=19	**2.54** (1.58 – 4.08) n=145

1. Primary reference category. The significant ($p < .01$) crash odds ratios are shown in bold. Source: Queensland Road Crash Database, Queensland Transport

Logistic regression analysis of the severity of crashes as a function of unlicensed driving and selected driver-related variables 2003-08

Variables	*B*	Std. error	Wald test	Odds Ratio	99% CI for Odds ratio	
					Upper	Lower
Gender						
Female	-	-	-	1.00	Referent	
Male	.05	.01	16.43*	1.05	1.02	1.08
Age						
12-20	-	-	-	1.00	Referent	
21-29	.03	.02	2.45	1.03	0.98	1.07
30-49	.10	.02	40.25*	1.11	1.06	1.15
50-69	.19	.02	121.35*	1.22	1.16	1.28
70 and over	.43	.03	252.73*	1.54	1.43	1.65
Vehicle type						
Car/truck/bus	-	-	-	1.00	Referent	
Motorcycle	1.55	.02	5287.16*	4.69	4.44	4.96
Licence status						
Licensed	-	-	-	1.00	Referent	
Unlicensed	.41	.03	264.97*	1.50	1.41	1.60

Full model vs. constant-only model: $\chi^2(9) = 5945.6$, $p < .001$; Nagelkerke $R^2 = .04$. * $p < .001$

Logistic regression analysis of the severity of crashes as a function of unlicensed driver types and selected driver-related variables 2003-08

Variables	*B*	Std. error	Wald test	Odds Ratio	99% CI for Odds ratio	
					Upper	Lower
Gender						
Female	-	-	-	1.00		
Male	.05	.01	16.46*	1.05	1.02	1.08
Age						
12-20	-	-	-	1.00		
21-29	.03	.02	3.01	1.03	0.99	1.08
30-49	.10	.02	42.13*	1.11	1.07	1.16
50-69	.20	.02	123.26*	1.22	1.17	1.28
70 and over	.43	.03	254.25*	1.54	1.44	1.65
Vehicle type						
Car/truck/bus	-	-	-	1.00		
Motorcycle	1.54	.02	5165.28*	4.66	4.41	4.92
Licence status						
Licensed	-	-	-	1.00		
Never licensed	.48	.06	56.79*	1.61	1.37	1.89
Disqualified/suspended	.40	.04	126.39*	1.49	1.36	1.64
Inappropriate class	.75	.12	39.13*	2.12	1.56	2.89
Expired	.28	.08	12.29*	1.32	1.08	1.61
Other unlicensed	.37	.05	54.18*	1.45	1.27	1.65

Full model vs. constant-only model: $\chi^2(11) = 5958.6$, $p < .001$; Nagelkerke $R^2 = .04$
* $p < .001$